

Name: _____

Date: _____

Exam: Function Reflections (Solution version 23)

1. Let function f be defined by the polynomial below:

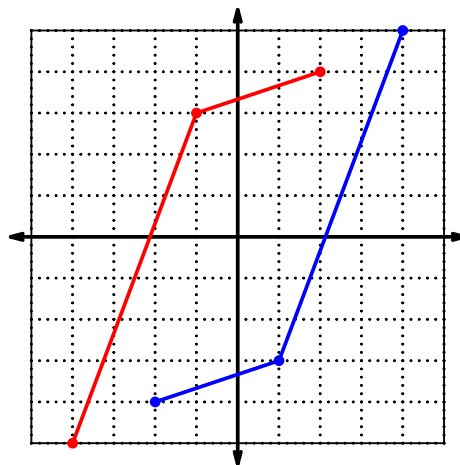
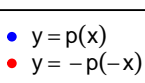
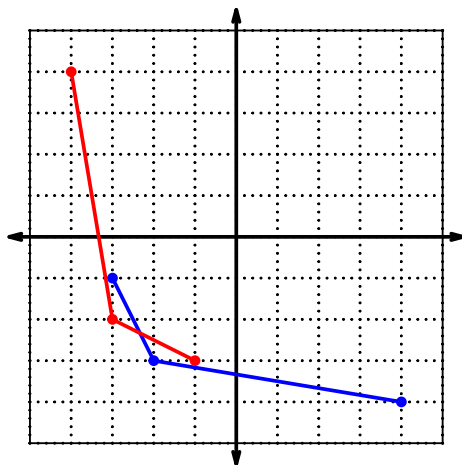
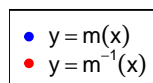
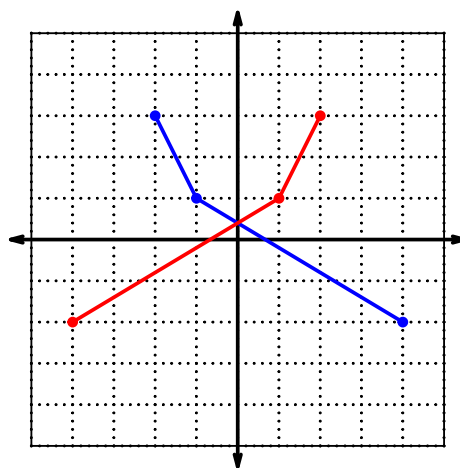
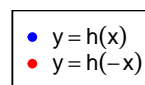
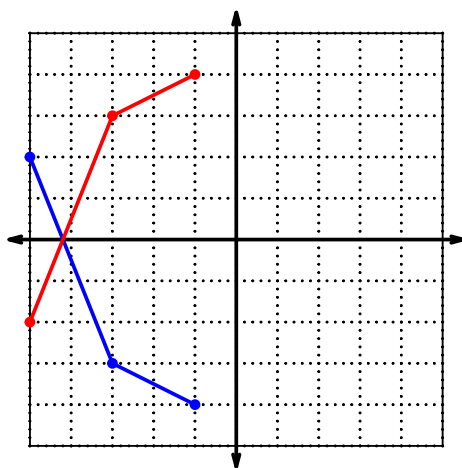
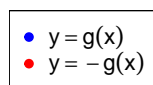
$$f(x) = -5x^4 + 4x^3 + 2x^2 - 8x - 6$$

Draw lines that match each function reflection with its polynomial:

Reflections**Polynomials**

$f(-x)$	●	●	$5x^4 + 4x^3 - 2x^2 - 8x + 6$
$-f(-x)$	●	●	$5x^4 - 4x^3 - 2x^2 + 8x + 6$
$-f(x)$	●	●	$-5x^4 - 4x^3 + 2x^2 + 8x - 6$

2. In each xy plane shown below, a function is graphed with blue. Draw the indicated reflections (as a second curve, indicated in legend) with black (or with whatever you have). The x axis is horizontal and the y axis is vertical (as typical), and the scale is equal on both axes.



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For all questions on this page, the functions f , g , and h are defined by the table below.

x	$f(x)$	$g(x)$	$h(x)$
1	6	2	5
2	9	3	7
3	1	9	4
4	8	1	1
5	2	4	9
6	5	8	3
7	3	7	6
8	4	5	2
9	7	6	8

3. Evaluate $h(3)$.

$$h(3) = 4$$

4. Evaluate $f^{-1}(6)$.

$$f^{-1}(6) = 1$$

5. By filling more rows of the table, it is possible to make function g **even**. If that were done, what would be the value of $g(-8)$?

If function g is even, then

$$g(-8) = 5$$

6. By filling more rows of the table, it is possible to make function h **odd**. If that were done, what would be the value of $h(-7)$?

If function h is odd, then

$$h(-7) = -6$$

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7. A function, f , is **even** if $f(x) = f(-x)$ for all x in the domain. A function, g , is **odd** if $g(x) = -g(-x)$ for all x in the domain.

Let polynomial p be defined with the following equation:

$$p(x) = -x^3 - x$$

- a. Express $p(-x)$ as a polynomial in standard form.

$$p(-x) = -(-x)^3 - (-x)$$

$$p(-x) = x^3 + x$$

- b. Express $-p(-x)$ as a polynomial in standard form.

$$-p(-x) = -(x^3 + x)$$

$$-p(-x) = -x^3 - x$$

- c. Is polynomial p even, odd, or neither?

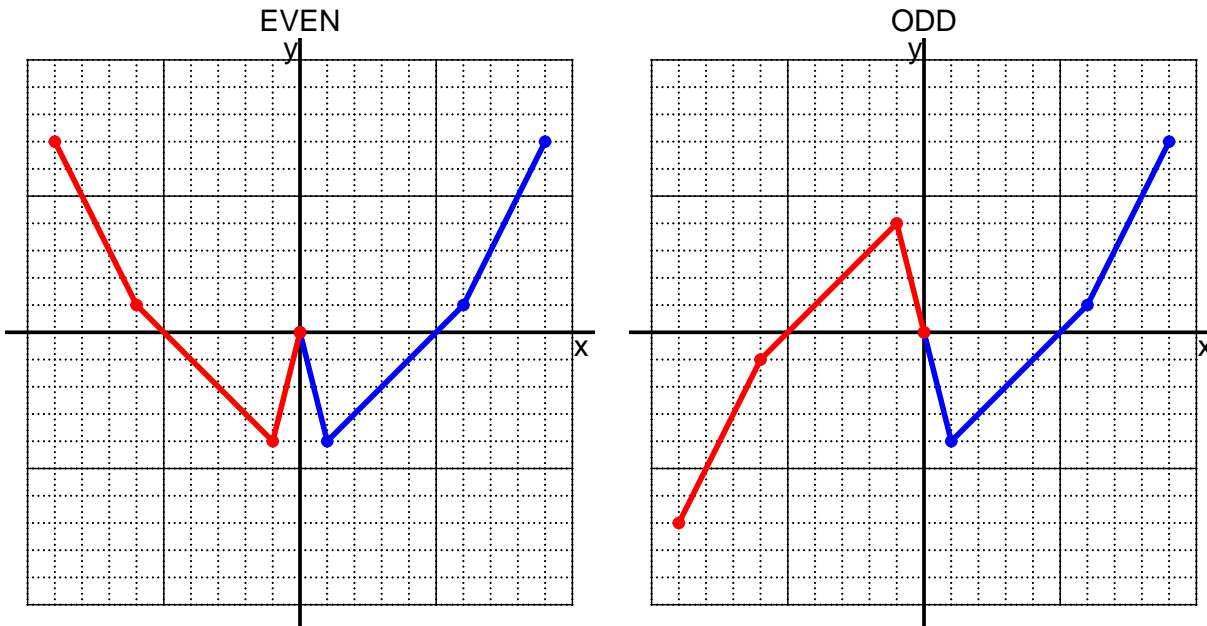
odd

- d. Explain how you know the answer to part c.

We see that $p(x) = -p(-x)$ for all x because $p(x)$ and $-p(-x)$ are equivalent polynomials. Thus function p satisfies the criterion for being an odd function.

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8. I have drawn half of a function. Draw the other half to make it even or odd.



9. Let function f be defined with the equation below.

$$f(x) = 5(x - 7)$$

a. Evaluate $f(10)$.

step 1: subtract 7
step 2: multiply by 5

$$\begin{aligned} f(10) &= 5((10) - 7) \\ f(10) &= 15 \end{aligned}$$

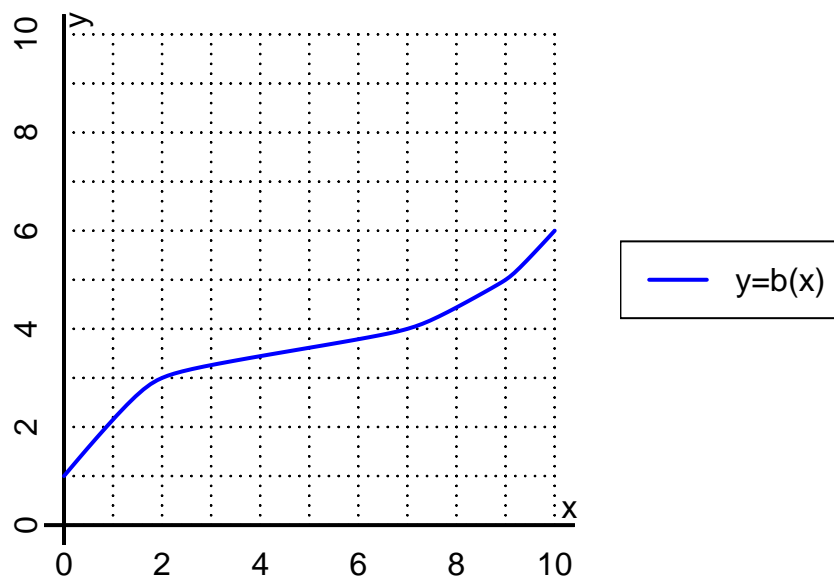
b. Evaluate $f^{-1}(20)$.

step 1: divide by 5
step 2: add 7

$$\begin{aligned} f^{-1}(x) &= \frac{x}{5} + 7 \\ f^{-1}(20) &= \frac{(20)}{5} + 7 \\ f^{-1}(20) &= 11 \end{aligned}$$

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10. The function b is represented by the curve $y = b(x)$ graphed below.



a. Evaluate $b(7)$.

$$b(7) = 4$$

b. Evaluate $b^{-1}(3)$.

$$b^{-1}(3) = 2$$

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11. Function f is defined by the table below.

a. Complete the columns for $-f(x)$ and $f(-x)$ and $-f(-x)$.

x	$f(x)$	$-f(x)$	$f(-x)$	$-f(-x)$
-2	-7	7	-7	7
-1	8	-8	8	-8
0	0	0	0	0
1	8	-8	8	-8
2	-7	7	-7	7

b. Is function f even, odd, or neither?

even

c. How do you know the answer to part b?

Function f is even because column $f(-x)$ matches column $f(x)$ exactly.